

WHAT IS CLAIMED IS:

1. A wavefront measurement system comprising:
 - a source of electromagnetic radiation;
 - an imaging system that focuses said electromagnetic radiation at an object plane;
 - a first grating positioned in said object plane, said first grating including a plurality of rulings having randomized height;
 - a stage for moving said first grating parallel to said rulings;
 - a projection optical system that projects an image of said first grating onto an image plane;
 - a second grating at said image plane; and
 - a detector that receives a fringe pattern produced by said second grating.
2. The system of claim 1, wherein said electromagnetic radiation is 13-15 nm.
3. The system of claim 1, wherein said source is an Extreme Ultraviolet (EUV) radiation source.
4. The system of claim 1, further including a wafer stage on which said second grating is mounted.
5. The system of claim 1, wherein said stage moves grating by a distance sufficient to substantially eliminate spatial coherence at said detector.
6. The system of claim 1, wherein said detector is optically conjugate with a pupil of said projection optics.

7. The system of claim 1, wherein said first grating is a reflective grating.

8. A wavefront measurement system comprising:
a source of electromagnetic radiation;
an imaging system that focuses said electromagnetic radiation at an object plane;
a first grating positioned on a reticle stage that generates a diffraction pattern at an image plane, said first grating including a plurality of reflecting lines, said first grating being movable parallel to said reflecting lines;
a projection optical system that projects an image of said first grating onto said image plane;
a second grating positioned on a wafer stage in said image plane that receives a diffracted image of said first grating; and
a detector positioned on said wafer stage that receives said image of said first grating.

9. The system of claim 8, wherein said electromagnetic radiation is 13-15 nm.

10. The system of claim 8, wherein said source is an Extreme Ultraviolet (EUV) radiation source.

11. The system of claim 8, further including a wafer stage on which said second grating is mounted.

12. The system of claim 8, wherein said first grating is movable by a distance sufficient to substantially eliminate spatial coherence at said detector.

13. The system of claim 8, wherein said detector is optically conjugate with a pupil of said projection optics.

14. The system of claim 8, wherein said first grating is a reflective grating.

15. A wavefront measurement system comprising:
a source of electromagnetic radiation;
an imaging system that focuses said electromagnetic radiation at an object plane;
a linear grating in said object plane;
a surface having a randomized height positioned at a plane optically conjugate with said object plane;
a stage for moving said surface with said randomized height;
a projection optical system that projects an image of said linear grating onto an image plane;
a second grating at said image plane; and
a detector that receives a fringe pattern produced by said second grating.

16. A wavefront measurement system comprising:
a source of electromagnetic radiation;
an imaging system that focuses said electromagnetic radiation at an object plane;
a linear grating in said object plane;
a surface having a randomized height in a plane conjugate with said object plane;
a stage for moving said surface with said randomized height;
a projection optical system that projects an image of said linear grating onto an image plane;
a second grating at said image plane;

a detector that receives a fringe pattern produced by said second grating; and
means for reducing speckle at said detector.

17. A method of measuring a wavefront of an optical system comprising:

generating electromagnetic radiation at a source;

focusing said electromagnetic radiation at an object plane of said optical system;

positioning a first grating in an optical path of said optical system that conditions said electromagnetic radiation at said object plane, said first grating including a plurality of rulings;

optically conjugating an image plane and said object plane;

receiving said image of said source through said second grating while simultaneously moving said first grating parallel to said rulings; and

determining wavefront parameters from said image.

18. A method of measuring a wavefront of an optical system comprising:

(1) generating electromagnetic radiation at a source;

(2) focusing the electromagnetic radiation at an object plane of the optical system;

(3) positioning a first grating in an optical path of the optical system that conditions the electromagnetic radiation at the object plane, the first grating including a plurality of rulings;

(4) conjugating an image plane and the object plane;

(5) positioning a detector below the image plane and a second grating at the image plane;

(6) receiving the image of the source through the second grating while simultaneously moving the first grating parallel to the rulings; and

(7) calculating wavefront parameters from the image.